

Windows 2000/2003

HP StorageWorks Disk Array XP operating system configuration guide

XP48
XP128
XP512
XP1024
XP12000

second edition (August 2004)

part number: A5951-96191

This guide describes the requirements and procedures for connecting the XP family of disk arrays to a Windows 2000/2003 system and configuring the new disk array for operation with Windows 2000/2003.



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HP StorageWorks Disk Array XP OS Configuration Guide: Windows 2000/2003

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About this guide

This guide describes the requirements and procedures for connecting the XP family of disk arrays to a Windows server and configuring the disk array for operation with Windows 2000/2003.

Intended audience

This guide is intended for system administrators who have knowledge of the following topics:

- Data processing concepts
- Direct access storage device subsystems and their basic functions
- Disk arrays and RAID technology
- Operating system commands and utilities

Disk arrays

Unless otherwise noted, the term *disk array* refers to these disk arrays:

HP Surestore Disk Array XP512
HP Surestore Disk Array XP48
HP StorageWorks Disk Array XP128
HP StorageWorks Disk Array XP1024
HP StorageWorks XP12000 Disk Array

Related documentation

HP provides the following related documentation:

- *HP StorageWorks Disk Array XP128: Owner's Guide*
- *HP StorageWorks Disk Array XP1024: Owner's Guide*
- *HP StorageWorks XP12000 Disk Array Owner's Guide*
- *HP StorageWorks Command View XP for XP Disk Arrays: User Guide*

For information about operating system commands and third-party products, refer to the manufacturer's documentation.

Conventions

This guide uses the following text conventions.

| | |
|--|--|
| Figure 1 | Blue text represents a cross-reference. For the online version of this guide, the reference is linked to the target. |
| www.hp.com | Underlined, blue text represents a website on the Internet. For the online version of this guide, the reference is linked to the target. |
| literal | Bold text represents literal values that you type exactly as shown, as well as key and field names, menu items, buttons, file names, application names, and dialog box titles. |
| <i>variable</i> | Italic type indicates that you must supply a value. Italic type is also used for manual titles. |
| <code>input/output</code> | Monospace font denotes user input and system responses, such as output and messages. |
| <i>Example</i> | Denotes an example of input or output. The display shown in this guide may not match your configuration exactly. |
| [] | Indicates an optional parameter. |
| { } | Indicates that you must specify at least one of the listed options. |
| | Separates alternatives in a list of options. |

HP technical support

In North America, call technical support at 1-800-652-6672, available 24 hours a day, 7 days a week.

Outside North America, call technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP website under support:

<http://h18006.www1.hp.com/storage/arraysystems.html>

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

For continuous quality improvement, calls may be recorded or monitored.

HP storage website

For the most current information about HP StorageWorks XP products, visit the support website. Select the appropriate product or solution from this website:

<http://h18006.www1.hp.com/storage/arraysystems.html>

For information about product availability, configuration, and connectivity, consult your HP account representative.

HP authorized reseller

For the name of your nearest HP authorized reseller, you can obtain information by telephone:

United States 1-800-345-1518

Canada 1-800-263-5868

Or contact: www.hp.com

Revision history

| | |
|-------------|---|
| July 2004 | First release. |
| August 2004 | Second edition to add XP12000 and combine Windows 2000 with Windows 2003. |

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Installation

Installation of the HP StorageWorks Disk Array XP is performed by your HP service representative and you. The HP service representative installs the disk array and formats the disk devices. You configure the host server for the new devices with assistance from the HP service representative.

Features and requirements

The disk array and host have the following features and requirements.

- HP StorageWorks disk arrays:
 - XP48:** Up to 48 drives from 72 GB to 8.7 TB, 24 FC ports
 - XP128:** From 8 to 128 drives for up to 18 TB, 48 FC ports
 - XP512:** Up to 512 drives from 72 GB to 93 TB, 48 FC ports
 - XP1024:** From 8 to 1024 drives for up to 149 TB, 64 FC ports
 - XP12000:** Up to 1152 drives for up to 165 TB, 128 FC ports
- Windows 2000/2003 PC server with the latest HP supported patches
- *(Recommended option)* HP StorageWorks Secure Path I/O path failover software to manage path failovers.
- Host Bus Adapters (HBAs): Install adapters and all utilities and drivers. Refer to the adapter documentation for installation details.
- *(Recommended option)* HP StorageWorks Command View XP with LUN and security management features installed, or Remote Control with the LUN and security management options installed. These products allow you to configure the disk array ports and paths.
- Other available XP Software (some may not apply to your system):
 - HP StorageWorks Business Copy XP
 - HP StorageWorks Continuous Access XP
 - HP StorageWorks Continuous Access Extension XP
 - HP StorageWorks Auto LUN XP
 - HP StorageWorks Data Exchange XP
 - HP StorageWorks Resource Manager XP
 - HP StorageWorks RAID Manager XP
 - HP StorageWorks Cache LUN XP
 - HP StorageWorks Auto Path XP
 - HP StorageWorks Cluster Extension XP
 - HP StorageWorks Performance Advisor XP software

Fibre Channel interface

The XP48, XP128, XP512, and XP1024 disk arrays support these 1 Gbps and 2 Gbps Fibre Channel interfaces:

- Short-wave non-OFC (open fiber control) optical interface
- Multimode optical cables with SC or LC connectors
- Public or private arbitrated loop (FC-AL) or fabric direct attach

Even though the interface is Fibre Channel, this guide uses the term “SCSI disk” because disk array devices are defined to the host as SCSI disks.

Device emulation types

The disk arrays support the following device emulation types:

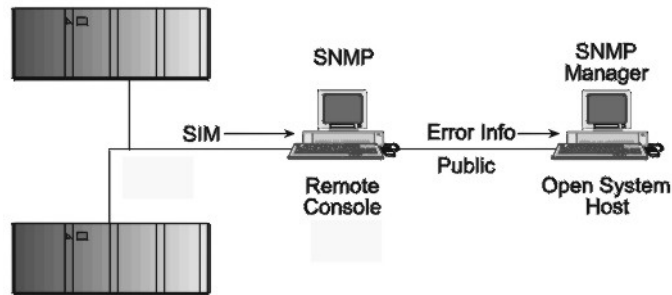
- **OPEN-x devices:** OPEN-x logical units represent disk devices. Except for OPEN-V, these devices are based on fixed sizes. OPEN-V is a user-defined size. Supported emulations include OPEN-3, OPEN-8, OPEN-9, OPEN-E, OPEN-L, and OPEN-V devices.
- **LUSE devices (OPEN-x*n):** Logical Unit Size Expansion (LUSE) allows you to combine 2 to 36 OPEN-x devices to create expanded LDEVs larger than standard OPEN-x disk devices. For example, an OPEN-x LUSE volume created from ten OPEN-x CVS volumes is designated as OPEN-x*10.
- **CVS devices (OPEN-x CVS):** Volume Size Configuration (VSC) defines custom volumes (CVS) that are smaller than normal fixed-sized logical disk devices (volumes). (OPEN-V is a CVS-based custom disk size that you determine. OPEN-L does not support CVS.)
- **LUSE (expanded) CVS devices (OPEN-x*n CVS):** LUSE CVS combines CVS devices to create an expanded device. This is done by first creating CVS custom-sized devices and then using LUSE to combine from 2 to 36 CVS devices. For example, if three OPEN-9 CVS volumes are combined to create an expanded device, this device is designated as OPEN-9*3-CVS.

Failover

The disk arrays support many standard software products that provide host, application, or I/O path failover and logical volume (storage) management.

SNMP configuration

The disk arrays support standard Simple Network Management Protocol (SNMP) for remotely managing the disk array from the host. The SNMP agent on the remote console PC or Command View can provide status and Remote Service Information Message (R-SIM) reporting to the SNMP manager on the host for up to eight disk arrays. To configure the SNMP manager on the host, refer to the operating system documentation.



Installation procedures

The HP representative and you perform the following procedures:

1. Install and configure the disk array ([page 18](#)).
 - Setting the Host Mode for the disk array ports
 - Setting the system option mode
 - Configuring the Fibre Channel ports
2. Install and configure the host ([page 22](#)).
 - Loading the OS and software
 - Installing the HBAs
 - Fabric zoning and LUN security
3. Connect the disk array ([page 26](#)).
 - Defining the paths
 - Verifying the host recognizes array devices
4. Configure disk devices ([page 29](#)).

Install and configure the disk array

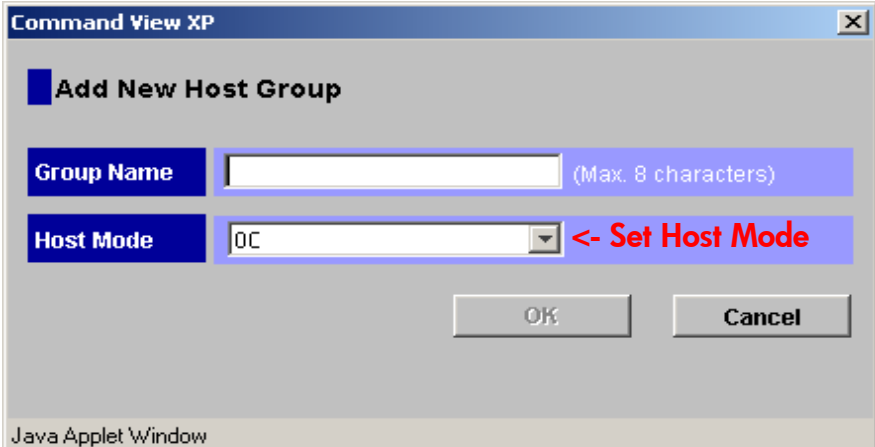
The HP service representative performs the following tasks:

- Final hardware assembly and software installation
- Loading the microcode updates
- Installing the channel adapters (CHAs) and cabling
- Installing and formatting devices

You perform the additional tasks below. If you do not have Command View or Remote Control, your HP service representative can perform these tasks for you.

Setting the Host Mode for the disk array ports

The disk array ports have Host Modes that you must set according the table on the following page. After the disk array is installed, use the LUN configuration management facility of Command View (shown) or the Remote Control LUN configuration management option to set the Host Mode for each port.



Command View XP

Add New Host Group

Group Name (Max. 8 characters)

Host Mode <- Set Host Mode

OK Cancel

Java Applet Window

The available Host Mode settings for Windows 2000/2003 are as follows:

| Host Mode | Description |
|--|--|
| 00 | Not recommended by HP. For FC HBAs without MSCS (clustering) |
| 08 | Not recommended by HP. For D8602 HBA with or without MSCS (clustering) |
| 0C | Recommended by HP if future online LUN expansion is not anticipated. If you expand volumes, you must do so offline, first unmapping and then remapping the volumes. |
| 2C (available on some array models) | Recommended by HP for use with LUSE volumes when online LUN expansion is required or may be required in the future. You can expand volumes online without remapping them. The emulation type is displayed as shown in the following table. |

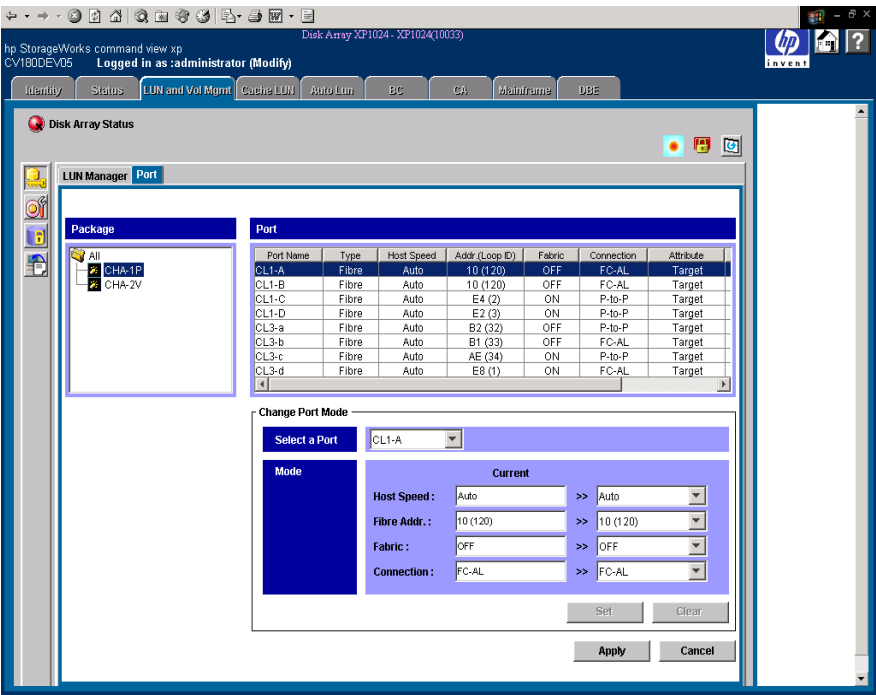
| Volume on XP Array (examples) | Volume name as seen on host | |
|-------------------------------------|-----------------------------|----------------|
| | Host Mode = 00, 08, 0C | Host Mode = 2C |
| OPEN-E | OPEN-E | OPEN-E |
| OPEN-9 | OPEN-9 | OPEN-9 |
| OPEN-9*2 | OPEN-9*2 | OPEN-9 |
| OPEN-9*3-CVS | OPEN-9*3-CVS | OPEN-9-CVS |

Setting the system option mode

The HP representative sets the System Option Mode(s) based on the operating system and software configuration of the host.

Configuring the Fibre Channel ports

Configure the disk array Fibre Channel ports by using Command View (shown) or Remote Control. Select the settings for each port based on your storage area network topology. Use switch zoning if you connect different types of hosts to the array through the same switch.



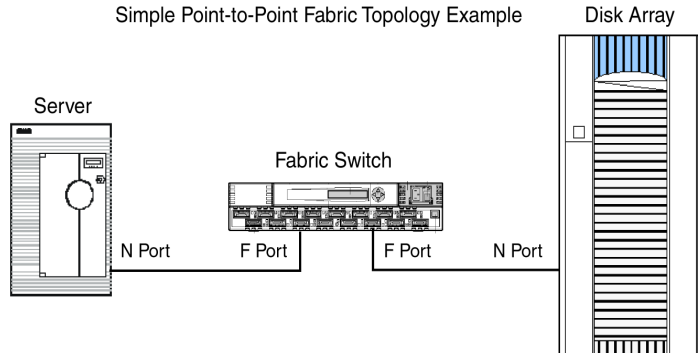
Fibre Address

In fabric environments, the port addresses are assigned automatically. In arbitrated loop environments, you set the port addresses by selecting a unique arbitrated loop physical address (AL-PA) or loop ID for each port on the loop.

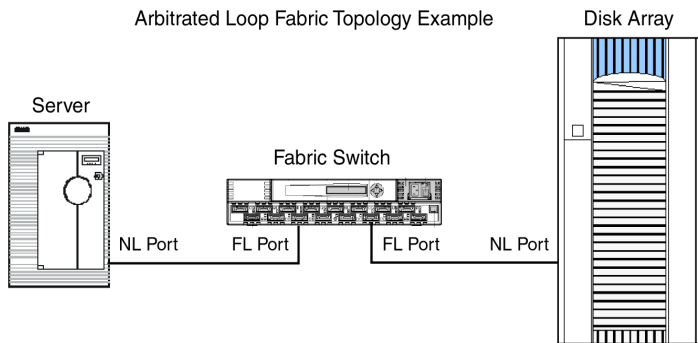
Fabric and Connection parameter settings

You can set each array port to FABRIC ON or OFF with connections of POINT-TO-POINT or FC-AL as shown in the following table and figures. For detailed topology information, refer to the *HP StorageWorks SAN Design Reference Guide* on the hp.com website.

Simple Point-to-Point Fabric Topology Example



Arbitrated Loop Fabric Topology Example



| Fabric Parameter | Connection Parameter | Provides |
|------------------|----------------------|---|
| OFF | FC-AL | NL-port (private arbitrated loop) |
| ON | FC-AL | NL-port (public loop) for loop connection to a switch |
| ON | POINT-TO-POINT | N-port (fabric port) for connection to a switch |
| OFF | POINT-TO-POINT | Not supported |

Install and configure the host

Install and configure the host and host bus adapters (HBAs) that connect the host to the disk array.

Loading the OS and software

Follow the manufacturer's instructions to load the operating system and software onto the host. Load all OS patches and configuration utilities supported by HP and the HBA manufacturer.

If you purchased multipath software, install it according to the manufacturer's instructions.

Installing the HBAs

Install the server HBAs using the HBA manufacturer's instructions.

HP supplies driver, firmware, and BIOS downloads for commonly available HBAs. These downloads contain HBA settings that are tested and approved by HP. To obtain a download, log onto the HP website at www.hp.com and search for the model name or number of your HBA. Download the file, and follow the installation instructions in the 'readme' or documentation file supplied with each download.

Follow the manufacturer's instructions to install the driver files that come with the HBA. HP recommends using the default driver parameters that are set automatically when you install the driver.

Cross referencing HBAs

The following cross reference table identifies both the HP part number and the HBA manufacturer's number for common HBAs.

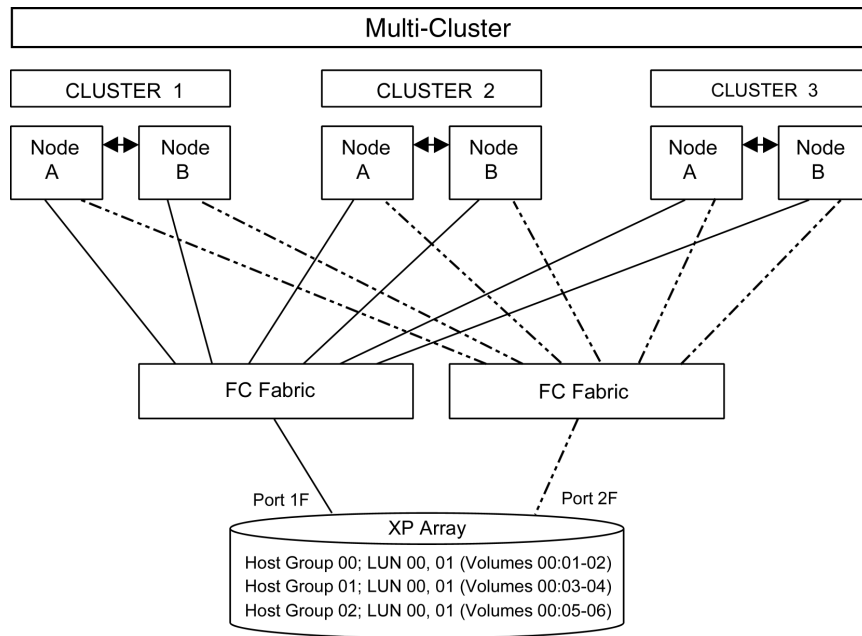
| HP Part | OEM Partner | OEM Adapter | Family (*1) |
|-----------------------|-------------|-------------|-------------|
| FCA2355 | Emulex | LP9002DC | 1 |
| FCA2101 | Emulex | LP952 | 1 |
| FCA2408 / A7298A | Emulex | LP982 | 2 |
| FCA2404 / AB232A | Emulex | LP9802 | 2 |
| FCA2404DC | Emulex | LP9802DC | 2 |
| A7388A / AB467A | Emulex | LP1050 | 3 |
| A7387A / AB466A | Emulex | LP1050DC | 3 |
| None | Emulex | LP10000 | 3 |
| FCA2214 | QLogic | QLA2340 | 4 |
| FCA2214DC | QLogic | QLA2342 | 4 |
| Blade Mezzanine BL20p | QLogic | None | 4 |
| Blade Mezzanine BL30p | QLogic | None | 5 |

Note *1: Family number shows which HBAs can use similar driver/BIOS/firmware.

Fabric zoning and LUN security

By using appropriate zoning and LUN security, you can connect various servers with various operating systems to the same switch and fabric:

- Host zones must contain only homogeneous operating systems.
- Storage port zones may overlap if more than one operating system needs to share an array port.
- Heterogeneous operating systems may share an XP array port if you use Secure Manager and set the appropriate host group and mode; all others must connect to a dedicated XP array port.
- Use Secure Manager for LUN isolation when multiple hosts connect through a shared array port. Secure Manager provides LUN security by allowing you to restrict which LUNs each host can access.
- QLogic and Emulex HBAs must be in separate zones (a QLogic zone and an Emulex zone) whether the HBAs are in the same or separate servers.
- If booting over the SAN, within a server, the booting HBAs must be from the same vendor. Additional data storage HBAs can be from a different vendor.
- If you plan to use clustering, install and configure the clustering software on the servers. Clustering is the organization of multiple servers into groups. Within a cluster, each server is a node. Multiple clusters compose a multi-cluster environment. The following example shows a multi-cluster environment with three clusters, each containing two nodes. The nodes share access to the disk array.



| Environment | OS Mix | Fabric Zoning | LUN Security |
|--------------------------------|--|---------------|--|
| Standalone SAN (non-clustered) | homogeneous (a single OS type present in the SAN) | Not required | Must be used when multiple hosts connect through a shared port |
| | heterogeneous (more than one OS type present in the SAN) | Required | |
| Clustered SAN | homogeneous (a single OS type present in the SAN) | Not required | Must be used when multiple cluster nodes connect through a shared port |
| | heterogeneous (more than one OS type present in the SAN) | Required | |
| Multi-Cluster SAN | homogeneous (a single OS type present in the SAN) | Not required | Must be used when multiple cluster nodes connect through a shared port |
| | heterogeneous (more than one OS type present in the SAN) | Required | |

Connect the disk array

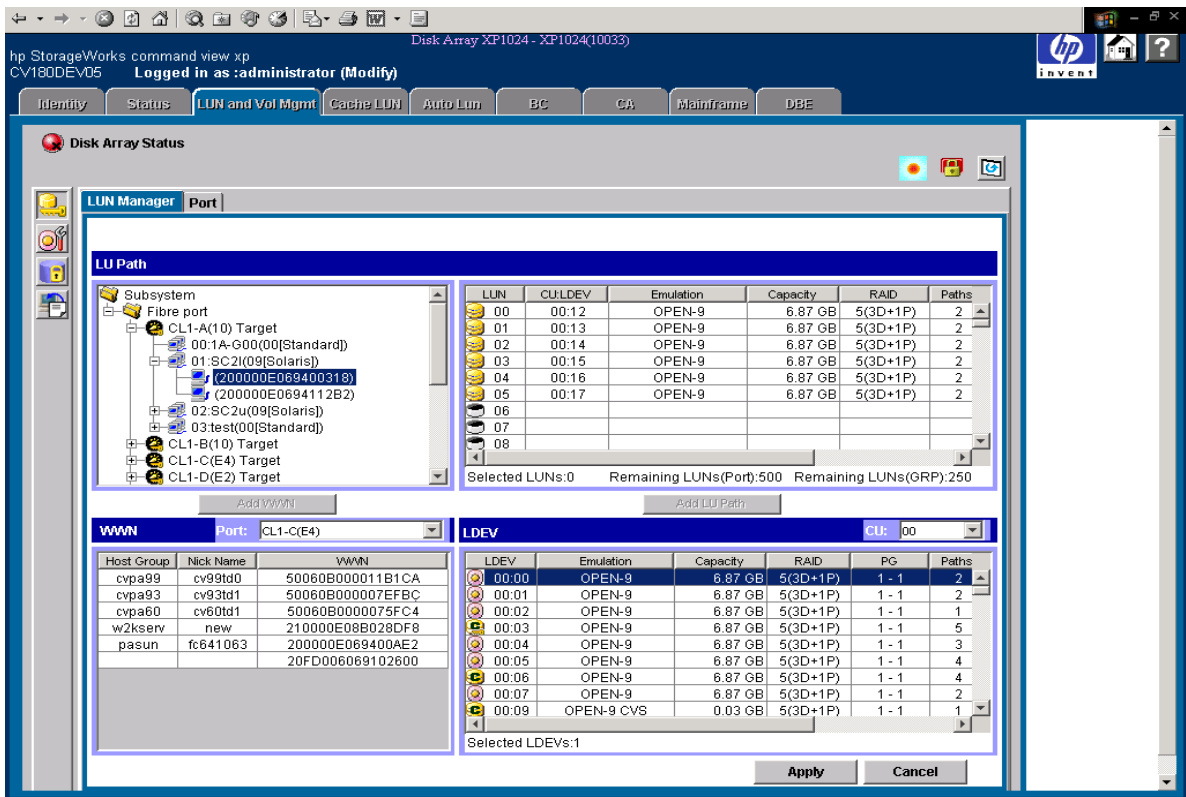
The HP representative connects the cables between the array and the host or between the array and the SAN.

Defining the paths

Use the LUN configuration management facility of Command View (shown) or the Remote Control LUN configuration management option to create paths (LUNs) between hosts and volumes in the disk array, also called LUN mapping. LUN mapping includes these tasks:

- Configuring ports
- Setting LUN security
- Creating host groups by operating system and setting their host modes
- Assigning host bus adapter WWNs to host groups.
- Mapping volumes to host groups (by assigning LUNs).

For details, see the Command View or Remote Control LUN Configuration Manager guide. Note LUNS and their ports, WWNs, nicknames, and LDEVs for later use in verifying host and device configuration.



Verifying the host recognizes array devices

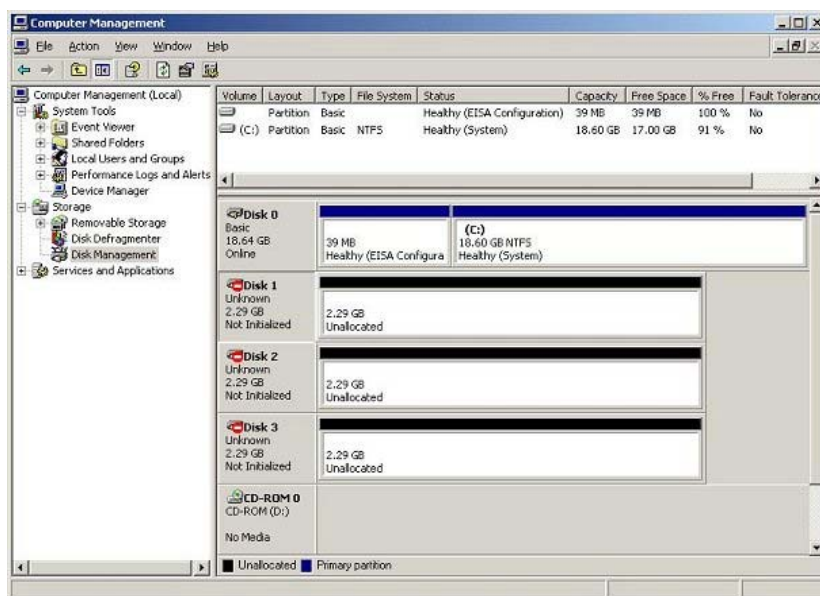
1. Log into the host as an administrator.
2. View the hardware listed in the **Device Manager** as described in the following steps.
3. Right-click on the **My Computer** desktop icon, and click **Manage**.
4. Click **Device Manager**.
5. Click **SCSI and RAID Controllers**.
6. Click the **host bus adapter** to open it, and verify all devices are displayed.
7. Click each device, click **Properties**, and then click **Settings**.
8. Record the device information on the worksheet in Appendix A.

Configure disk devices

Configure the disk devices in the same way you would configure any new disk on the host. Follow these steps:

Write signatures

1. Right-click on the **My Computer** desktop icon, and click **Manage**.
2. Click **Disk Management**. A message notifies you that disks have been added.



3. Click **OK** to update the system configuration and start the “Write Signature” wizard, which allows you to write signatures to the disks.
4. For each new disk, click **OK** to write a signature, or click **No** to prevent writing a signature.

When you have performed this process for all new disks, the Disk Management main window opens and displays the added disks.

Create and format disk partitions

Dynamic Disk is supported with no restrictions for a disk array connected to a Windows 2000/ 2003 system. Refer to Microsoft's online help for details.

Caution

Do not partition or create a file system on a device that will be used as a raw device (for example, some database applications use raw devices.)

5. In the **Disk Management** main window, select the unallocated area for the SCSI disk you want to partition.
6. Click the **Action** menu, and click **Create Partition** to launch the New Partition Wizard. Follow the Partition Wizard to create and format partitions and assign drive letters. Format partitions with the following settings and format options:

File System: NTFS (enables Windows to write to the disk).

Allocation unit size: "Default." Do not change this entry.

Volume label: Enter a volume label, or leave this field blank for no label.

Format Options: Click **Perform a Quick Format** to decrease the time required to format the partition. Click **Enable file and folder compression** only if you want to enable compression.

7. Verify the Disk Management main window displays the correct file system (NTFS) for the formatted partition. The word "Healthy" indicates that the partition has been created and formatted successfully.
8. Repeat this procedure for each new disk device.
9. When you exit Disk Management, click **Yes** to save your changes.

Verify file system operations

10. Open My Computer and check that the new disks are present.
11. Right-click on each disk to view **Properties** and verify the properties are correct (label, type, capacity, and file system).
12. Copy a file from an existing drive to each new drive to verify the new drives are working, and then delete the copies.

Troubleshooting

If you encounter an error condition, see [“Error conditions” on page 32](#) for recommended actions.

If you are unable to resolve an error condition, ask your HP support representative for assistance. See [“Calling the HP support center” on page 34](#).

Error conditions

| Error Condition | Recommended Action |
|--|--|
| The logical devices are not recognized by the host. | <p>Verify that the READY indicator lights on the disk array are ON.</p> <p>Verify that fiber cables are correctly installed and firmly connected.</p> <p>Verify that the target IDs are properly configured. The LUNs for each TID must start at 0 and continue sequentially without skipping any numbers.</p> <p>Verify that the TIDs/WWNs on each bus are unique. Do not install two devices with the same ID on the same bus.</p> <p>Recheck the buses for new devices.</p> <p>Verify that LUSE devices are not intermixed with normal LUNs on the same port.</p> <p>Verify that the maximum number of LUSE devices per port has not been exceeded.</p> <p>Verify that the disk array Host Mode is set correctly.</p> |
| The host does not reboot properly after hard shutdown. | <p>If you power off the host without executing the shutdown process, wait three minutes to allow the disk array's internal timeout process to purge queued commands. If the host restarts while the disk array is processing queued commands, the host may not reboot successfully.</p> |
| Physical volumes cannot be created. | <p>Verify that the disk array logical devices are correctly formatted.</p> |
| Logical volumes cannot be created. | <p>Verify that the volume capacity for OPEN-x volumes is not greater than the maximum capacity allowed. See the Device Emulations Appendix.</p> <p>Verify that the capacity of the volume group is not less than the total capacity of the partitioned logical volume.</p> |

| Error Condition | Recommended Action |
|---|---|
| A file system is not mounted after rebooting. | <p>Verify that the host was restarted correctly.</p> <p>Verify that the file system attributes are correct.</p> |
| The disk array performs a self reboot because the disk array was busy or it logged a panic message. | Reboot the host. |
| The disk array responds “Not Ready” or the disk array has displayed “Not Ready” and timed out. | Contact HP. |
| The host detects a parity error. | <p>Check the HBA and make sure it was installed properly.</p> <p>Reboot the host.</p> |
| The host hangs or devices are declared and the host hangs. | Make sure there are no duplicate disk array TIDs and that disk array TIDs do not conflict with any host TIDs. |

Calling the HP support center

If you need to call HP customer support, provide as much information about the problem as possible, including the circumstances of the error or failure and the exact content of any error messages.

Depending on your system configuration, you may be able to view error messages as follows:

- View SIMs in Command View (Device Health tab).
- View R-SIMs in Remote Control XP, including reference codes and severity levels of recent R-SIMs.
- View SIMs that generate SNMP traps on the host.

A

Worksheet

Path worksheet

| LDEV (CU:LDEV) (CU = control unit) | Device type | SCSI bus number | Path 1 | Alternate paths | | |
|---|------------------------|----------------------------|---------------|------------------------|----------------------|----------------------|
| 0:00 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:01 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:02 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:03 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:04 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:05 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:06 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:07 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:08 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:09 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:10 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:11 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:12 | | | | TID: LUN: | TID: LUN: | TID: LUN: |
| 0:13 | | | | TID: LUN: | TID: LUN: | TID: LUN: |

Disk array device emulations

This appendix provides information about disk array supported emulations and device type specifications. Some parameters may not be relevant to your array. Consult your HP representative for information about supported configurations for your system.

Supported emulations

| XP Type | Emulation | OPEN-x | LUSE | CVS | LUSE & CVS |
|----------------------------|-----------|--------|------|-----|------------|
| XP48 XP512 | OPEN-3 | Yes | Yes | Yes | Yes |
| | OPEN-8 | Yes | Yes | Yes | Yes |
| | OPEN-9 | Yes | Yes | Yes | Yes |
| | OPEN-E | Yes | Yes | Yes | Yes |
| | OPEN-K | Yes | Yes | Yes | Yes |
| | OPEN-L | Yes | Yes | | |
| | OPEN-M | Yes | Yes | | |
| | OPEN-V | | | | |
| XP128 XP1024 XP12000 | OPEN-3 | Yes | Yes | Yes | Yes |
| | OPEN-8 | Yes | Yes | Yes | Yes |
| | OPEN-9 | Yes | Yes | Yes | Yes |
| | OPEN-E | Yes | Yes | Yes | Yes |
| | OPEN-K | | | | |
| | OPEN-L | Yes | Yes | | |
| | OPEN-M | | | | |
| | OPEN-V | Yes | Yes | | |

Device type specifications

| Device Type (Note 1) | Category (Note 2) | Blocks (512 bytes) | Sector Size (bytes) | # of Cylinders | Heads | Sectors per Track | Capacity MB* (Note 3) |
|-------------------------|----------------------|-------------------------|---------------------------|-------------------|-------|-------------------------|--------------------------|
| OPEN-3 | SCSI disk | 4806720 | 512 | 3338 | 15 | 96 | 2347 |
| OPEN-8 | SCSI disk | 14351040 | 512 | 9966 | 15 | 96 | 7007 |
| OPEN-9 | SCSI disk | 14423040 | 512 | 10016 | 15 | 96 | 7042 |
| OPEN-E | SCSI disk | 28452960 | 512 | 19759 | 15 | 96 | 13893 |
| OPEN-L | SCSI disk | 71192160 | 512 | 49439 | 15 | 96 | 34761 |
| OPEN-V | SCSI disk | max=125827200 | 512 | Note 5 | 15 | 128 | Note 6 |
| LUSE | | | | | | | |
| OPEN-3*n | SCSI disk | 4806720*n | 512 | 3338*n | 15 | 96 | 2347*n |
| OPEN-8*n | SCSI disk | 14351040*n | 512 | 9966*n | 15 | 96 | 7007*n |
| OPEN-9*n | SCSI disk | 14423040*n | 512 | 10016*n | 15 | 96 | 7042*n |
| OPEN-E*n | SCSI disk | 28452960*n | 512 | 19759*n | 15 | 96 | 13893*n |
| OPEN-L*n | SCSI disk | 71192160*n | 512 | 49439*n | 15 | 96 | 34761*n |
| OPEN-V*n | SCSI disk | max=125827200 Note 4 | 512 | Note 5 | 15 | 128 | Note 6 |
| CVS | | | | | | | |
| OPEN-3 CVS | SCSI disk | Note 4 | 512 | Note 5 | 15 | 96 | Note 6 |
| OPEN-8 CVS | SCSI disk | Note 4 | 512 | Note 5 | 15 | 96 | Note 6 |
| OPEN-9 CVS | SCSI disk | Note 4 | 512 | Note 5 | 15 | 96 | Note 6 |
| OPEN-E CVS | SCSI disk | Note 4 | 512 | Note 5 | 15 | 96 | Note 6 |
| CVS LUSE | | | | | | | |
| OPEN-3*n CVS | SCSI disk | Note 4 | 512 | Note 5 | 15 | 96 | Note 6 |
| OPEN-8*n CVS | SCSI disk | Note 4 | 512 | Note 5 | 15 | 96 | Note 6 |
| OPEN-9*n CVS | SCSI disk | Note 4 | 512 | Note 5 | 15 | 96 | Note 6 |
| OPEN-E*n CVS | SCSI disk | Note 4 | 512 | Note 5 | 15 | 96 | Note 6 |
| OPEN-V*n | SCSI disk | Note 4 | 512 | Note 5 | 15 | 128 | Note 6 |

*Capacity = (512 x number of blocks) ÷ 1024²

Note 1: The availability of a disk type depends on the disk array.

Note 2: The devices are defined to the host as SCSI disk devices, even though the interface is Fibre Channel.

Note 3: The device capacity can sometimes be changed by the BIOS or host adapter board. This may make actual capacity different from that listed in the table.

Note 4: The number of blocks for a CVS volume is calculated as follows:
of blocks = (# of cylinders) × (# of heads) × (# of sectors per track)

Example 1: For an OPEN-3 CVS volume with capacity = 37 MB:
of blocks = (53 cylinders—see Note 5) × (15 heads) × (96 sectors per track) = 76320

Example 2: For an OPEN-V CVS volume with capacity = 49 MB:
of blocks = (53 cylinders—see Note 5) × (15 heads) × (128 sectors per track) = 101760

Note 5: The number of cylinders for a CVS volume is calculated as follows
(↑ ...↑ means that the value should be rounded up to the next integer):

OPEN-3/8/9/E: The number of cylinders for a CVS volume =
of cylinders = ↑ (capacity (MB) specified by user) × 1024/720 ↑

Example: For an OPEN-3 CVS volume with capacity = 37 MB:
of cylinders = ↑ 37 × 1024/720 ↑ = ↑ 52.62 ↑ (rounded up to next integer) = 53 cylinders

OPEN-V: The number of cylinders for a CVS volume =
of cylinders = ↑ (capacity (MB) specified by user) × 16/15 ↑

Example: For an OPEN-V CVS volume with capacity = 49 MB:
of cylinders = ↑ 49 × 16/15 ↑ = ↑ 52.26 ↑ (rounded up to next integer) = 53 cylinders

OPEN-3/8/9/E: The number of cylinders for a CVS LUSE volume =
of cylinders = ↑ (capacity (MB) specified by user) × 1024/720 ↑ × n

Example: For a CVS LUSE volume with capacity = 37 MB and $n = 4$
of cylinders = $\lceil 37 \times 1024 / 720 \rceil \times 4 = \lceil 52.62 \rceil \times 4 = 53 \times 4 = 212$

OPEN-V: The number of cylinders for a CVS LUSE volume =
of cylinders = $\lceil (\text{capacity (MB) specified by user}) \times 16 / 15 \rceil \times n$

Example: For an OPEN-V CVS LUSE volume with capacity = 49 MB and $n = 4$
of cylinders = $\lceil 49 \times 16 / 15 \rceil \times 4 = \lceil 52.26 \rceil \times 4 = 53 \times 4 = 212$

Note 6: The capacity of an OPEN-3/8/9/E CVS volume is specified in MB, not number of cylinders. The capacity of an OPEN-V CVS volume can be specified in MB or number of cylinders. You set the volume size using the LUN Configuration Manager or Command View software.

Glossary

| | |
|---------------------------------------|--|
| AL | Arbitrated loop. |
| AL-PA | Arbitrated loop physical address. |
| BC | HP StorageWorks Business Copy XP. BC lets you maintain up to nine local copies of logical volumes on the disk array. |
| CA | HP StorageWorks Continuous Access XP. CA lets you create and maintain duplicate copies of local logical volumes on a remote disk array. |
| Command View | HP StorageWorks Command View XP, a software product for managing XP arrays. Command View runs on a Windows-based management workstation. |
| command device | An LDEV that transfers RAID commands to BC or CA logical volumes. |
| CVS | CVS devices (OPEN-x CVS) are custom volumes that are smaller than normal fixed-sized logical disk devices (volumes). |
| CU | Control Unit. Contains LDEVs and is approximately equivalent to SCSI Target ID. |
| DKC (disk controller unit) | The array cabinet that houses the channel adapters and service processor (SVP). |
| DKU (disk cabinet unit) | The array cabinets that house the disk array physical disks. |
| emulation modes | Emulation modes can be assigned to LDEVs to make them operate like standard OPEN system disk drives. The emulation mode of an LDEV determines its capacity. Refer to the appendices for device capacities. |

| | |
|---------------|--|
| FC | Fibre Channel. |
| FC-AL | Fibre Channel arbitrated loop. |
| FCP | Fibre Channel Protocol. |
| HBA | Host bus adapter. |
| HP | Hewlett-Packard Company. |
| LDEV | Logical device. An LDEV is created when a RAID group is divided into sections using a selected host emulation mode (for example, OPEN-9 or OPEN-M). The number of resulting LDEVs depends on the emulation mode. “LDEV” and “volume” are synonyms. |
| LUN | Logical unit number. A LUN results from mapping a SCSI logical unit number, port ID, and LDEV ID to a RAID group. The size of the LUN is determined by the emulation mode of the LDEV and the number of LDEVs associated with the LUN. For example, a LUN associated with two OPEN-3 LDEVs has a size of 4,693 MB. |
| LUSE | Logical Unit Size Expansion, a feature which logically combines LDEVs so they appear as a larger LDEV. This allows a LUN to be associated with 2 to 36 LDEVs. LUSE allows applications to access data requiring large amounts of disk space. |
| OFC | Open Fibre Control. |
| OPEN-x | A general term describing any one of the supported OPEN emulation modes (for example, OPEN-L). |
| OS | Operating system. |
| PA | Physical address. |
| path | “Path” and “LUN” are synonymous. Paths are created by associating a port, a target, and a LUN ID with one or more LDEVs. |

| | |
|----------------------------|--|
| port | A connector on a channel adapter card in the disk array. A port passes data between the disk array and external devices, such as a host server. Ports are named using a port group and port letter, for example, CL1-A. |
| RAID | Redundant array of independent disks. |
| remote console PC | The PC running HP StorageWorks Remote Control XP. |
| Remote Control (RC) | HP StorageWorks Remote Control XP. A software product used for managing XP arrays. |
| R-SIM | Remote service information message. |
| SCSI | Small computer system interface. |
| SIM | Service information message. |
| SNMP | Simple Network Management Protocol. |
| SVP | Service processor. A notebook computer built into the disk array. The SVP provides a direct interface to the disk array and is used only by the HP service representative. |
| TID | Target ID. |
| Volume | On the XP array, a volume is a uniquely identified virtual storage device composed of a control unit (CU) component and a logical device (LDEV) component separated by a colon. For example 00:00 and 01:00 are two uniquely identified volumes; one is identified as CU = 00 and LDEV = 00, and the other as CU = 01 and LDEV = 00; they are two unique separate virtual storage devices within the XP array. |
| VSC | Volume Size Configuration is a feature that defines custom volumes (CVS volumes) that are smaller than normal fixed-sized logical disk devices (volumes). |
| WWN | World Wide Name. A unique identifier assigned to a Fibre Channel device. |

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